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(54) Wheelchair with monocoque chassis and pivotable seat.

(57) The wheelchair comprises a chassis (3) mounted on four wheels (5, 7) with a seat (1) mounted on the chassis (3). The chassis (3) is a box shaped monocoque design and houses the electric motors (27) and battery power supply (29). The monocoque chassis (3) provides a light weight construction which retains its rigidity throughout the life of the wheelchair and by virtue of the rear wheels (7) being mounted on axles (25) which pass through the side walls (11) of the box shaped chassis (3), the heavy battery (29) and motors (27) contained within the chassis (3) can be mounted as low as possible to optimise the stability of the wheelchair. Further, the seat (1) is mounted on the chassis (3) so as to be releasable from a ready for use position and pivoted forwards to allow for easy access to the battery (29) and electric motors (27) for servicing or repair.

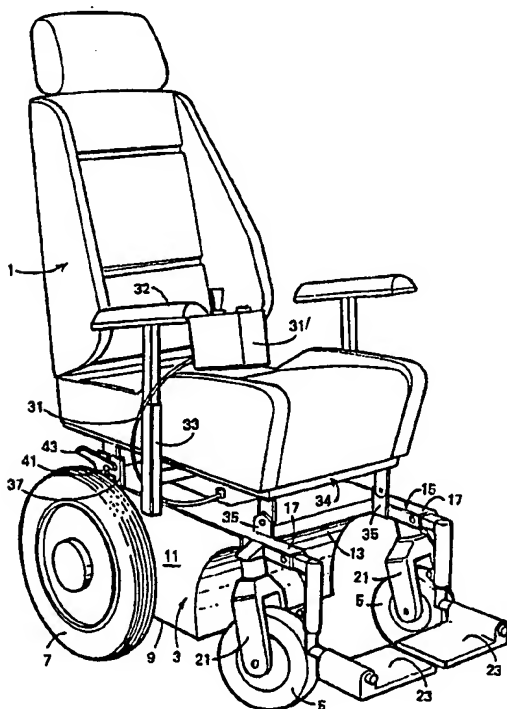


FIG. 1

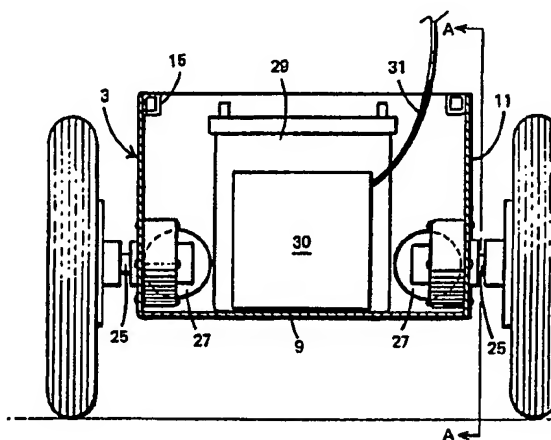


FIG. 4

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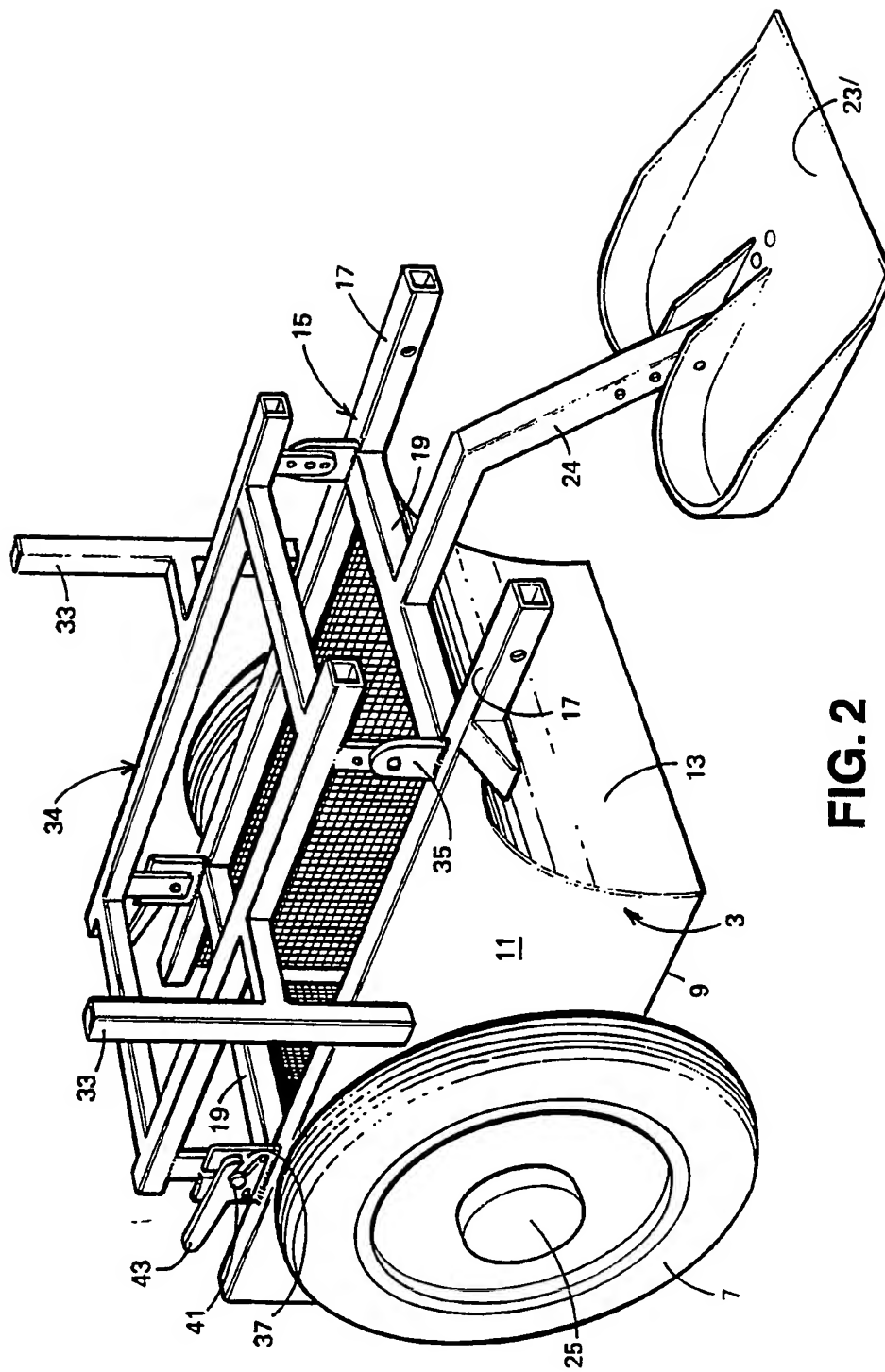


FIG. 2

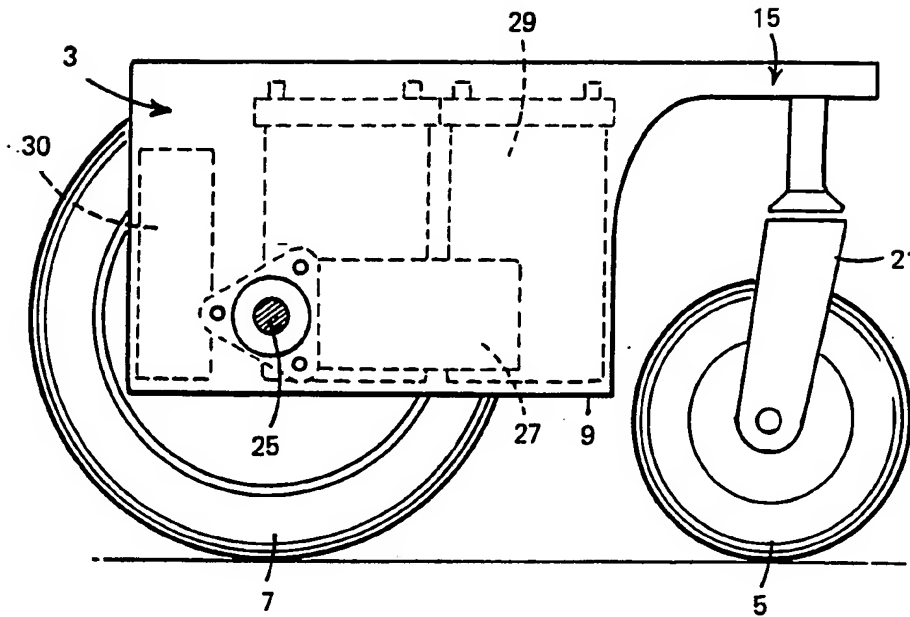


FIG. 3

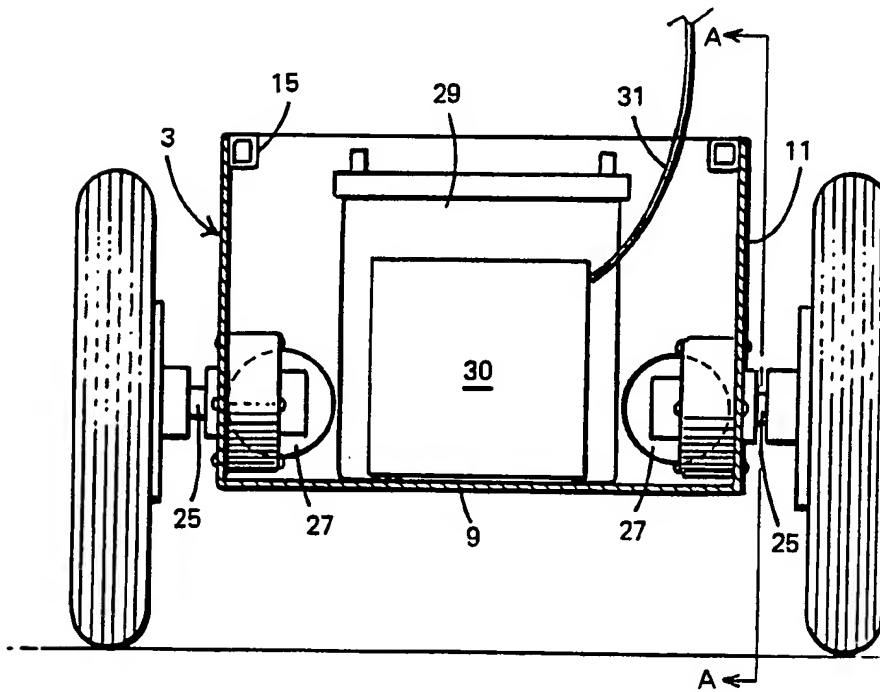


FIG. 4

-1-
DESCRIPTION

IMPROVEMENTS RELATING TO WHEELCHAIRS

The present invention relates to a wheelchair for use by a disabled person.

In particular the present invention relates to a motorised wheelchair which can be simply controlled by the person sitting in the wheelchair. Known motorised wheelchairs are usually powered by one or more electric motors which are driven by one or more electrically charged batteries which usually require to be charged on a daily basis eg. over night.

In certain such known motorised wheelchairs the or each battery is located beneath the seat. Whilst this is a convenient out-of-the-way place it is an awkward position with regard to servicing or installing/removing the battery, there being limited access. To remove the battery which is usually clamped in position, the battery has to be first disconnected and then released, this being difficult in itself due to the limited access available under the wheelchair seat. Then the battery has to be lifted slightly and moved sideways to clear the seat. This is again difficult as is the reverse operation of battery replacement/installation. Also servicing and repair of the electric motors is a somewhat complicated and thus an expensive operation requiring

some disassembly of the wheelchair construction to merely gain access to the motors.

In certain known motorised wheelchairs the electric motor or motors and the battery or batteries, are supported on top of a chassis which runs on four wheels, the centre of gravity of the construction being thus relatively high with regard to the ground on which the wheelchair travels. As the or each battery is conventionally a heavy item the wheelchair is unstable and can be susceptible to tipping especially in inclined locations.

Further, in certain known motorised wheelchairs the seat, wheels, motor etc, are supported on a chassis which is in the form of a framework comprised of elongate sections, some of which are crossed and secured together by bolts. Whilst these chassis are strong and rigid when new, wear and tear through continued usage can cause the framework sections to loosen, the rigidity and thus safety of the construction being impaired.

The aim of the present invention is to provide a wheelchair which is an improvement over prior art wheelchair constructions.

According to the present invention there is provided a wheelchair comprising a chassis which is mounted on wheels, a seat being mounted on the chassis

so as to be pivotable about a generally horizontal axis between a ready for use position and a position which allows for access to the chassis, and releasable locking means being provided to secure the seat in the ready for use position on the chassis.

Preferably the seat is mounted on a pivotable frame mounted on the chassis, the frame being pivotable about its front edge with the rear part of the said frame being lockable in the ready for use position by rotatable latches mounted on the chassis. These rotatable latches may be rotated to engage over lateral projections on the frame and secure the seat in the ready for use position. When required the latches may be rotated to disengage from the lateral projections and allow the seat and frame to be pivoted.

By pivoting the seat out of the ready for use position, easy access to the chassis is provided. Thus with electric motors and batteries mounted on the chassis these components can be relatively easily repaired, serviced or replaced.

According to a further aspect of the present invention there is provided a wheelchair comprising a chassis mounted on wheels, a seat being mounted on the chassis, said chassis being a monocoque construction in which an electric motor for powering the

wheelchair, and a battery for storing and supplying electrical power to the motor, are located.

Preferably the monocoque chassis is fabricated from metal sheet, and is generally box-shaped, the box shape being open at the top and having a seat chassis comprising two elongate members extending forwards and to the rear of the box shape as viewed on the wheelchair, along the upper edges of the box shape, and two transverse members. Front wheels are preferably mounted on the forward end regions of the elongate members, each front wheel being freely rotatable about a generally horizontal axis and about a substantially vertical axis. Larger rear wheels are mounted on axles which extend through the side walls of the box shape, each axle preferably connecting with a specific electric motor to allow for precision movement. Preferably the two electric motors are synchronised for forward motion, able to be driven at different speeds to execute precise turns, and able to rotate in opposite directions at the same speed to allow the wheelchair to turn on a circular path ie. within its own length.

By virtue of the monocoque chassis design the chassis besides being relatively light also retains its strength and rigidity during the life of the wheelchair.

To facilitate access to the battery and motor the seat may be pivotable from a locked ready position to a position, preferably forwards, wherein the open top of the monocoque chassis is exposed. Also the rear panel of the monocoque chassis may be removable to facilitate battery charging.

To enhance stability the base of the monocoque chassis, which supports the electric motor or motors and the battery or batteries, is a planar sheet with the rear wheel axles passing through the side walls of the monocoque chassis, so that the planar sheet is located as close to the ground on which the wheelchair travels, as possible. In this way the centre of gravity of the wheelchair is as low as possible thus optimising the stability of the wheelchair in all situations.

With the wheelchair construction of the present invention a large number of different seat designs can be simply used, thus enabling a person to effectively customise his/her wheelchair.

The present invention will now be further described, by way of example, with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of a preferred embodiment of the present invention;

Fig. 2 is a perspective view of the chassis of

the embodiment of Fig. 1, with an alternative foot rest attached;

Fig. 3 is a cross sectional view along line A-A in Fig. 4; and

Fig. 4 is a rear view of the chassis assembly of the embodiment of Fig. 1 with the rear chassis panel removed.

A preferred embodiment of wheelchair constructed according to the present invention is shown in the accompanying drawings, the wheelchair comprising a seat 1 which is mounted on a chassis 3, the chassis 3 being supported on two freely rotatable front wheels 5 and two driven rear wheels 7.

The chassis 3 is of monocoque design and basically box-shaped, the chassis being open topped and having a planar base 9, two planar sides 11, a curved front wall 13 and a planar rear wall. A rectangular framework seat chassis 15 comprising two elongate members 17 and two transverse members 19, is secured to the upper edge of the box-shaped chassis 3 and said front wheels 5 are mounted one on each of the front end regions of said elongate members 17 so as to be freely rotatable about a substantially vertical axis as well as a generally horizontal axis. This is possible by the front wheels being each rotatable about a generally horizontal axle forming part of a

wheel carrier 21, which wheel carrier 21 is rotatably connected to an elongate member 17 so as to be freely rotatable about a substantially vertical axis.

Individual pivotal foot rests 23 are also carried by the front end regions of said elongate members 17. Alternatively a single integral foot rest 23' can be mounted in a forward extension 24 of the seat chassis 15 - see Fig. 2. This monocoque chassis design provides a basic rigidity to the wheelchair construction.

Each rear wheel 7 is mounted on an axle 25 which passes through one of the sides 11 of the monocoque design chassis 3 and connects with an electric motor 27, an electric motor being provided for each rear wheel 7. The electric motors 27 are powered by a battery 29, and a controller 30 located within the box chassis 3, is connected by a flexible electrical cable 31 to a manual control unit 31' located at the forward end of an armrest 32 which is vertically adjustibly carried by a vertical tubular section 33 of a frame 34 on which the seat 1 is mounted. The individual electric motors 27 provide for precise control, the motors being synchronised for forward travel, operable at differing speeds for precise turns, and operable in opposite directions at the same speed to enable the wheelchair to turn in a circle within its own length.

The base 9 of the box shaped chassis is located as close to the ground as possible so that as this base supports the heavy motors and battery, the centre of gravity of the wheelchair construction is at its lowest position, optimum stability of the wheelchair thus being achieved.

The elongate members 17 of the seat chassis 15 have upwardly directed front seat supports 35 and upwardly directed rear seat supports 37, on which the frame 34 which is rectangular, is mounted. The frame 34 is pivotally connected to the front seat supports 35 and has lateral projections 41 which are engageable with v-shaped recesses in the rear seat supports 37, a rotatable latch member 43 being rotatably mounted on each side of the seat chassis 15 and being rotatable over a lateral projection 41 of the said seat chassis 15 to hold said lateral projections in said recesses and thus hold the rear of the frame 34 against the seat chassis 15 in a ready for use position ie. the frame 34 cannot pivot about the front seat supports 35. By adjusting the vertical position of the lateral projections 43 on the frame and/or adjusting the vertical position of the pivotal connection between the frame 34 and the front seat supports 35, a number of adjustment positions being provided in the frame 34, the frame 34 can be adapted to correctly carry any

one of a large selection of seats 1, the seat 1 being merely bolted to the frame 34.

By releasing the latch members 43 the seat 1 and frame 34 can be pivoted forwards exposing the open top chassis 3 and allowing easy access for servicing and repair. For simply charging the battery 29, the rear panel of the chassis 3 is detachable to enable a simple electrical connection to be made.

The present invention thus provides a wheelchair which can be customised with a seat of a person's choice taken from a large selection of seats, which is relatively light and rigid throughout its life due to the monocoque chassis construction, and which is optimally stable.

-10-
CLAIMS

1. A wheelchair comprising a chassis which is mounted on wheels, a seat being mounted on the chassis so as to be pivotable about a generally horizontal axis between a ready for use position and a position which allows access to the chassis, and releasable locking means being provided to secure the seat in the ready for use position on the chassis.

2. A wheelchair as claimed in claim 1, in which the seat is pivotable about its front region with the rear of the seat being lockable in the ready for use position by said locking means.

3. A wheelchair as claimed in claim 1 or claim 2, in which the seat is mounted in a frame which is pivotally attached to the chassis and lockable to the chassis in the ready for use position, by said releasable locking means.

4. A wheelchair as claimed in claim 3, in which the frame is pivotally attached to the chassis to the front of the wheelchair with said releasable locking means being engageable with a rear part of the frame.

5. A wheelchair as claimed in claim 4, in which the pivotal attachment between the frame and the chassis is adjustable in a generally vertical direction and/or the rear part of the frame is adjustable to vary the height of the rear part of the

fram relativ to the chassis in the ready for use position.

6. A wheelchair as claimed in any one of claims 3 to 5, in which the releasable locking means is formed by a latch member pivotably mounted on the chassis and engageable with said frame when said frame attains the ready for use position.

7. A wheelchair as claimed in any one of the preceding claims, in which the chassis is a monocoque construction in which an electric motor for driving the wheelchair and a battery for storing and supplying electric power to the motor, are located.

8. A wheelchair as claimed in claim 7, in which the chassis is generally box-shaped and open at the top, with a generally rectangular seat chassis being secured to the open top region of the box shaped chassis.

9. A wheelchair as claimed in claim 8, in which the seat chassis comprises two parallel elongate members and two transverse members, said elongate members extending from front to rear of the wheelchair, with the front end regions of the said elongate members extending beyond the box shaped chassis and being supported on freely rotatable front wheels; rear wheels of the wheelchair being mounted on axles which extend through side walls of the box

shaped chassis.

10. A wheelchair as claimed in claim 8 or 9, in which a foot rest is mounted on the front region of the seat chassis.

11. A wheelchair as claimed in any one of claims 8 to 10, in which the box shaped chassis has a planar base which is located close to the plane the lower extremities of the wheels, said planar base carrying at least the battery for powering the electric motor.

12. A wheelchair as claimed in any one of claims 7 to 11, in which a pair of electric motors are located within the monocoque chassis, the electric motors being synchronised for forward motion, independently controllable at different speeds and controllable to rotate in opposite directions at the same speed.

13. A wheelchair comprising a chassis which is mounted on wheels, with a seat mounted in said chassis, said chassis being a monocoque construction in which an electric motor for driving the wheelchair and a battery for storing and supplying electrical power to the motor, are located.

14. A wheelchair as claimed in claim 13, in which the chassis is generally box shaped and open at the top with a generally rectangular seat chassis being secured to the open top region of the box shaped

chassis.

15. A wheelchair as claimed in claim 14, in which the seat chassis comprises two parallel elongate members and two transverse members, said elongate members extending from front to rear of the wheelchair, with the front end regions of the said elongate members extending beyond the box-shaped chassis and being supported on freely rotatable front wheels, rear wheels of the wheelchair being mounted on axles which extend through side walls of the box shaped chassis.

16. A wheelchair as claimed in claim 14 or 15, in which a foot rest is mounted on the front region of the seat chassis.

17. A wheelchair as claimed in any one of claims 14 to 16, in which the box shaped chassis has a planar base which is located close to the plane of the lower extremities of the wheels, said planar base carrying at least the battery for powering the electric motor.

18. A wheelchair as claimed in any one of claims 13 to 17, in which a pair of electric motors are located within the monocoque chassis, the electric motors being synchronised for forward motion, independently controllable at different speeds and controllable to rotate in opposite directions at the same speed.

19. A wheelchair as claimed in any one of claims 13 to 18, in which the seat is mounted on the chassis so as to be pivotable about a generally horizontal axis between a ready for use position and a position which allows access to the chassis, and releasable locking means are provided to secure the seat in the ready for use position on the chassis.

20. A wheelchair as claimed in claim 19, in which the seat is pivotable about its front region with the rear of the seat being lockable in the ready for use position by said locking means.

21. A wheelchair as claimed in claims 19 or 20, in which the seat is mounted on a frame which is pivotably attached to the chassis and lockable to the chassis in the ready for use position, by said releasable locking means.

22. A wheelchair as claimed in claim 21, in which the frame is attached to the chassis at the front of the wheelchair with said releasable locking means being engageable with a rear part of the frame.

23. A wheelchair as claimed in claim 22, in which the pivotal attachment between the frame and the chassis is adjustable in a generally vertical direction and/or the rear part of the frame is adjustable to vary the height of the rear part of the frame relative to the chassis in the ready for use

position.

24. A wheelchair as claimed in any one of claims 21 to 23 in which the releasable locking means is formed by a latch member pivotably mounted on the chassis and engageable with said frame when said frame attains the ready for use position.

25. A wheelchair constructed and arranged substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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